

7. Examples of Network Data

The following sections present examples of data recorded by the NSF Spectroradiometer Network. These examples include both recent data (Volume 12), as well as data from as early as 1988. The discussions and data are presented by site, followed by site comparisons (Section 7.7.). For each site, UV data measured by the NSF network instruments are contrasted with total column ozone data from NASA's Total Ozone Mapping Spectrometer (TOMS). TOMS Version 7 ozone data from the current season were downloaded from the TOMS website at toms.gsfc.nasa.gov. UV measurements are represented by the 298.507-303.03 nm irradiance integral, and DNA- and erythemally (CIE) weighted irradiance (see Section 4.2.3). Both quantities are very sensitive to changes of solar zenith angle and atmospheric ozone. Peaks in the data usually coincide with minima in ozone.

Volume 12 noon-time data are compared to data from the years 1991-2000. In addition to individual data points mean values for the years 1991-2001 are presented. This allows the reader to judge how measurements taken on a given day in the current season compare with historic data. All UV-data shown here are based on observations recorded near local apparent noon (01:00 GMT for McMurdo, 16:00 GMT for Palmer, 00:00 GMT for South Pole, 17:00 GMT for Ushuaia, 20:00 GMT for San Diego, and 22:00 GMT for Barrow). For the austral sites, only data for the period September to December are presented, as these months are the most affected by ozone depletion. Barrow data are shown for the months February to June inclusive since the most severe ozone depletion in the Northern Hemisphere is shifted by about six months compared to austral sites. Since there is little change in total ozone column for San Diego relative to polar regions, data from the whole year is presented.

In addition to noon-time values, daily doses D are presented for all sites, which were derived by integrating instantaneous irradiance values over time:

$$D = \int_{x-12}^{x+12} E(t) dt$$

Here E symbolizes either DNA-weighted irradiance, erythemal irradiance, or spectral irradiance, integrated over 400-600 nm. The integration range is centered at the approximate local apparent noon. The implementation of the integration is explained in Section 4.2.4.

A comparison of daily doses from different sites is quite distinct from a comparison of noontime values, see Section 7.7. For example, for a high-latitude site the noontime values may be considerably lower than for San Diego. Daily doses, however, may be higher resulting from 24 hours of sunlight for sites inside the Polar Circle during summer. Many of the plots to follow serve to illustrate the range of variation inherent in the complete dataset for the different locations. Rather than trying to provide an encyclopedic data summary, we attempt to show examples that serve both to stimulate discussion and to illustrate some of the types of comparisons possible.

Section 7.8 analyzes trends in UV radiation based on data from all austral station. Section 7.9 gives a comprehensive overview of all factors affecting UV radiation at the ground such as solar zenith angle, total column ozone, clouds, surface albedo, aerosols, and altitude.